CLAIMS

What is claimed is:

Sub A5 1. A method for speculatively reusing regions of code, the method

2 comprising:

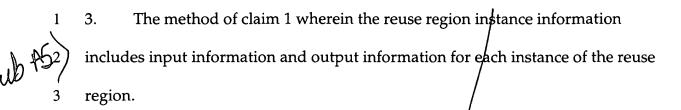3   identifying a reuse region and a data input to the reuse region;

4   determining whether a data output of the reuse region is contained within

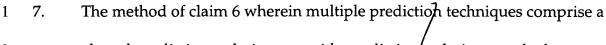5 reuse region instance information pertaining to a plurality of instances of the

6 reuse region; and

7   when the data output is not contained within the reuse region instance

8 information, predicting the data output of the reuse region based on the reuse

9 region instance information.

1 2. The method of claim 1 wherein determining whether the reuse region

2 instance information contains a data output comprises:

3   determining whether the data input to the reuse region matches any input

4 information within the reuse region instance information; and

5   when the data input matches input information within the plurality of

6 instances, determining whether the reuse region is identified by a normal reuse

7 instruction..

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1   3.   The method of claim 1 wherein the reuse region instance information

2   includes input information and output information for each instance of the reuse

3   region.

1   4.   The method of claim 3 wherein the reuse region instance information

2   further includes a plurality of confidence counters for each live-out register of the

3   reuse region, each of the plurality of confidence counters being associated with a

4   certain prediction technique.

1   5.   The method of claim 1 wherein predicting the data output further

2   comprises: predicting a current set of live-out registers of the reuse

3   region; and

4   predicting an output value for each live-out register within the current set

5   of live-out registers using at least one prediction technique and a prediction list

6   maintained in the buffer.

1   6.   The method of claim 5 wherein predicting an output value for each live-

2   out register further comprises selecting the at least one prediction technique from

3   multiple prediction techniques based upon a plurality of confidence counters

4   associated with the live-out register, each of the plurality of confidence counters

5   corresponding to a certain prediction technique.
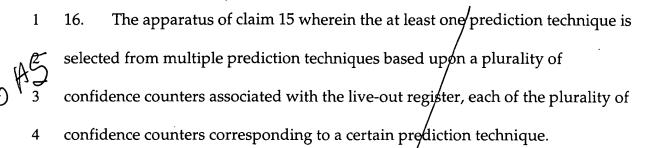

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1 7.   The method of claim 6 wherein multiple prediction techniques comprise a

2 context-based prediction technique, a stride prediction technique, and a last

3 value prediction technique.

1 8.   An apparatus comprising:

2   a buffer to hold reuse region instance information pertaining to a plurality

3 of instances of a reuse region; and

4   a processing core to predict a data output of the reuse region based on the

5 reuse region instance information, and to speculatively execute instructions

6 using the predicted data output of the reuse region.

1 9.   The apparatus of claim 8 wherein the processing core is configured to

2 determine whether a data output of the reuse region is to be predicted.

1 10.   The apparatus of claim 9 wherein the processing core is further configured

2 to search the buffer for a matching instance and to determine whether the reuse

3 region is identified by a normal reuse instruction

1 11.   The apparatus of claim 8 wherein the reuse region instance information

2 includes input information and output information for each instance of the reuse
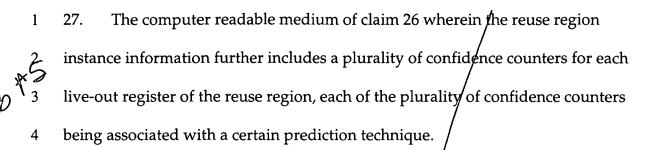
3 region.

1   12.   The apparatus of claim 11 wherein the reuse region instance information

2   further includes a plurality of confidence counters for each live-out register of the

3   reuse region, each of the plurality of confidence counters being associated with a

4   certain prediction technique.

1   13.   The apparatus of claim 8 wherein the buffer includes a prediction list

2   having a plurality of pointers to reuse region instances held in the buffer, a

3   pointer to the most currently used instance being located on the top of the

4   prediction list and a pointer to the least currently used instance being located at

5   the bottom of the prediction list.

1   14.   The apparatus of claim 8 wherein the buffer includes a value prediction

2   table having an entry that includes a predicted output value, the predicted

3   output value being located using an index.

1   15.   The apparatus of claim 8 wherein the processing core is further configured

2   to predict a current set of live-out registers of the reuse region, and to predict an

3   output value for each live-out register within the current set of live-out registers

4   using at least one prediction technique and a prediction list maintained in the

5   buffer.

1   16.   The apparatus of claim 15 wherein the at least one prediction technique is

2 selected from multiple prediction techniques based upon a plurality of

3 confidence counters associated with the live-out register, each of the plurality of

4 confidence counters corresponding to a certain prediction technique.

1   17.   The apparatus of claim 16 wherein multiple prediction techniques

2 comprise a context-based prediction technique, a stride prediction technique, and

3 a last value prediction technique and wherein the prediction list points to

4   the most recently used instance when the last value prediction technique

5 is used,

6   two most recently used instances when the stride prediction technique is

7 used, and

8   instances associated with a corresponding live-out register when the

9 context-based prediction technique is used, the associated instances being used

10 to calculate an index pointing to a predicted output value in a value prediction

11 table maintained in the buffer.

1   18.   A system comprising:

2   a memory to store regions of code; and

3   a processor, coupled to the memory, to identify a reuse region in the

4 regions of code, to determine whether a data output of the reuse region is

5 contained within reuse region instance information pertaining to a plurality of

6   instances of the reuse region, and when the data output is not contained within

7   the reuse region instance information, to predict the data output of the reuse

8   region based on the reuse region instance information.

1   19.   The system of claim 18 wherein the processor comprises a buffer to store

2   the reuse region instance information.

1   20.   The system of claim 19 wherein the reuse region instance information

2   includes input information and output information for each instance of the reuse

3   region.

1   21.   The system of claim 19 wherein the reuse region instance information

2   includes a plurality of confidence counters for each live-out register of the reuse

3   region, each of the plurality of confidence counters being associated with a

4   certain prediction technique.

1   22.   The system of claim 19 wherein the buffer includes a prediction list having

2   a plurality of pointers to reuse region instances held in the buffer.

1   23.   The system of claim 19 wherein the buffer includes a value prediction

2   table having an entry that includes a predicted output value, the predicted

3   output value being located using an index.

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1   24.   A computer readable medium comprising instructions, which when

2   executed on a processor, perform a method for speculatively reusing regions of

3   code, the method comprising:

4   identifying a reuse region and a data input to the reuse region;

5   determining whether a data output of the reuse region is contained within

6   reuse region instance information pertaining to a plurality of instances of the

7   reuse region; and

8   when the data output is not contained within the reuse region instance

9   information, predicting the data output of the reuse region based on the reuse

10   region instance information.

1   25.   The computer readable medium of claim 24 wherein determining whether

2   the reuse region instance information contains a data output comprises:

3   determining whether the data input to the reuse region matches any input

4   information within the reuse region instance information; and

5   when the data input matches input information within the plurality of

6   instances, determining whether the reuse region is identified by a normal reuse

7   instruction.

1   26.   The computer readable medium of claim 24 wherein the reuse region

2   instance information includes input information and output information for each

3   instance of the reuse region.

1   27.   The computer readable medium of claim 26 wherein the reuse region

2   instance information further includes a plurality of confidence counters for each

3   live-out register of the reuse region, each of the plurality of confidence counters

4   being associated with a certain prediction technique.

1   28.   The computer readable medium of claim 24 wherein predicting the data

2   output further comprises:

3   predicting a current set of live-out registers of the reuse region; and

4   predicting an output value for each live-out register within the current set

5   of live-out registers using at least one prediction technique and a prediction list

6   maintained in the buffer.

1   29.   The computer readable medium of claim 28 wherein predicting an output

2   value for each live-out register further comprises selecting the at least one

3   prediction technique from multiple prediction techniques based upon a plurality

4   of confidence counters associated with the live-out register, each of the plurality

5   of confidence counters corresponding to a certain prediction technique.

1   30.   The computer readable medium of claim 29 wherein multiple prediction

2   techniques comprise a context-based prediction technique, a stride prediction

3   technique, and a last value prediction technique.